अन्तर-विश्वविद्यालय त्वरक केन्द्र
INTER-UNIVERSITY ACCELERATOR CENTRE
(Formerly Nuclear Science Centre)
(विश्वविद्यालय अनुदान आयोग का स्वायत्त केन्द्र)
(An Autonomous Centre of UGC)

Dr. Amit Roy
DIRECTOR

Ref. IUAC/1.4/ 2159

November 10th, 2006

Dr. Shekhar Mishra,
Fermi National Accelerator Laboratory
P. O. Box – 500
Batavia, Illinois 60510-0500
U.S.A.

Dear Shekhar,

I am enclosing the two copies of MOU signed from our side. The appendices needs to be signed by Dr. Appollinari. Please get them signed and send one of the copies to us.

Thank you for all the efforts you have taken.

With warm personal regards,

Yours sincerely,

(Amit Roy)
Director, IUAC

Encl: 2 signed copies of MOU

MEMORANDUM
OF
UNDERSTANDING
Between
UNIVERSITIES RESEARCH ASSOCIATION INC., FERMI NATIONAL ACCELERATOR LABORATORY
AND
INTER UNIVERSITY ACCELERATOR CENTRE
CONCERNING
R&D TOWARDS HIGH INTENSITY PROTON SOURCES

INTRODUCTION

This Memorandum is written for mutual collaboration between Fermi National Accelerator Laboratory (FNAL), Batavia, Illinois, USA and Inter University Accelerator Centre (IUAC), New Delhi, India and sets out the basic understanding between the parties concerning collaboration on R&D towards high intensity proton sources based on a superconducting Linac.

This Memorandum is covered under the umbrella provided by the "Memorandum of Understanding between US Universities & Accelerator Laboratories and Indian Universities & Accelerator Laboratories concerning Collaboration on R&D for Various Accelerator Physics and High Energy Physics Projects" (attached) and signed by several Indian and US representatives.

Fermilab is leading a multi-institutional collaboration to develop superconducting proton linac technologies that could support a future High Intensity Neutrino Source (HINS). The collaboration goals are:

- to construct and operate a 60-100 MeV front end facility by about 2009-2010, based on spoke resonators and an RF distribution system capable of driving multiple resonators from a single klystron
- to develop an understanding of issues related to the transport of 8 GeV H^- ions;
- to understand and resolve issues related to high intensity (beyond 1×10^{14}) operations of the Main Injector
- to understand and resolve issues related to targeting beam powers of up to 2.5 MW for the purpose of generating an intense neutrino beam.

IUAC's interest in these technologies relates to potential utilization in forefront neutron sources.

WORK TO BE PERFORMED

Under the authority of this Memorandum both parties will contribute to the accomplishment of R&D aimed at demonstrating critical technologies and concepts that would support a high intensity neutrino source based on a superconducting proton Linac. Work will involve a combination of component fabrication and design studies.

SPECIFICS OF FUNDING AND SPECIFICATION OF WORK EFFORT

Appendices to this Memorandum will provide details of the specific work to be performed by each Institution. After the work is agreed to, specific Purchase Orders (P.O.) will be promulgated by the appropriate party. The P.O. will cite this MOU and the specific Appendix to this MOU under which the work to be performed under the P.O. is described. Each P.O. will have appropriate Terms and Conditions as negotiated by the Parties.

SIGNATORIES

S. D. Holmes 10/24/06
Fermilab, Associate Director for Accelerators

10 Nov 2006
Director of Inter University Accelerator Centre

10/24/06
Fermilab, HINS Program Manager

IUAC, HINS Coordinator

APPENDIX #1 TO MOU BETWEEN FNAL AND IUAC
CONCERNING R&D TOWARDS HIGH INTENSITY NEUTRINO SOURCES

According to the Memorandum of Understanding between Fermi National Accelerator laboratory and Inter University Accelerator Centre, FNAL and IUAC will collaborate on the construction, processing and testing of two Superconducting Single Spoke Resonators. This appendix specifies the funds transferred by FNAL to IUAC and the tasks performed by IUAC on these activities.

FNAL Deliverables

FNAL will transfer a total of 50 k$ to IUAC and Niobium material of appropriate dimensions and quality, towards construction of two Spoke cavity resonators.* Drawings of the spoke cavity will be transferred as well. Fixtures, dies and sketches, and/or photographs of the same will be transferred if available.

* On best effort basis.

IUAC Deliverables

The IUAC group will provide the following activities and deliverables in support of the HINS Program:

- Descriptions of procedures performed in setting up and preparing for EB welding.
- IUAC will perform the necessary chemical processing, including BCP and electropolishing as needed, for construction and assembly of two prototype single spoke β=0.22 cavities. The deliverables will consist of:
    - Two spoke cavities and written records of the procedures executed.
- IUAC may perform, if required, explosion bonding of the stainless-steel to niobium transition elements for the two prototype single-spoke β=0.22 cavities. FNAL will be responsible for delivery of Niobium to IUAC.
- The final cleaning, high pressure rinsing and testing of the cavities will be done in the US under FNAL supervision.
- IUAC personnel will interact with the FNAL Mechanical, Magnetic and RF Engineers for cavity development.
- Personnel from IUAC will visit FNAL during final cleaning and testing of the cavities. Accommodation for IUAC personnel will be provided by FNAL. FNAL personnel will visit IUAC during cavity fabrication. IUAC will provide acommodation to FNAL personnel during the visit.
- Contact Persons
    - IUAC: Amit Roy, Dinakar Kanjilal, P.N. Prakash
    - FNAL: Gennady Romanov, Bob Wagner, Giorgio Apollinari

SIGNATORIES for APPENDIX #1

Fermilab, HINS Program Manager

IUAC, HINS Coordinator